REMARKS

Prior to this response, claims 1-11, 15-24, 28, 29 and 33 were pending. Claims 34-43 have previously been withdrawn. Claims 12-14, 25-27 and 30-32 have previously been canceled. Claims 1-2, 17 and 21 are amended herein and the amendments are supported throughout the specification (e.g. ¶[0045]). No claims have been added. Therefore, claims 1-11, 15-24, 28, 29 and 33 are present for examination.

In the latest office action, the Examiner rejected claims 1 and 21 as well as their dependent claims for being obvious over three issued U.S. Patents. Embodiments of the invention relate to controlling processing conditions in plasma processing systems. Plasma power is adjusted during the processing of a substrate based on a measured optical property of a film on the substrate. Independent claims 1 and 21, as amended, are reproduced below for the Examiners convenience.

> 1. A method for processing a film over a substrate in a process chamber, the method comprising:
>
> flowing an inorganic process gas mixture suitable for processing the film over the substrate in the process chamber in accordance with a predetermined algorithm specifying process conditions;
>
> monitoring a parameter during processing of the film over a thickness greater than 3 μm; and
>
> changing the process conditions in response to a measured optical property of the film, wherein changing the process conditions comprises increasing, discretely, an RF source power. (emphasis added)
>
> * * *
>
> 21. A method for forming an optical waveguide over a substrate in a process chamber, the method comprising:
>
> forming a plasma in the process chamber;
>
> flowing an inorganic process gas mixture comprising a silicon-containing gas and an oxygen-containing gas in the process chamber in accordance with a predetermined algorithm specifying process conditions to deposit a film over the substrate;
>
> monitoring a refractive-index value of the film during deposition of the film over a thickness greater than 3 μm; and
>
> changing the process conditions during deposition in accordance with a correlation between the refractive-index value and the process conditions,

> wherein changing the process conditions comprises increasing an RF source power, continuously, for maintaining the plasma. (emphasis added)

All pending claims stand rejected as obvious over U.S. Patent No. 5,643,638 to Otto et al. ("Otto") in view of U.S. Patent No. 5,946,542 to Iyer ("Iyer") and the rejections of several dependent claims further used U.S. Patent No. 5,042,895 to Chouinard et al. ("Chouinard").

Otto discusses a plasma CVD method of producing a layer of material having a graded refractive index. The method uses a chemical precursor which contains an organic component which leaves a varying amount of organic content depending on the plasma excitation pulses applied in the processing chamber. The varying amount of organic content is used to affect the refractive index of a film and to spatially vary the refractive indices present at different levels of the film. The following excerpt from Otto can be found in column 4 beginning at line 22.

> In the invention, a coating gas is used which contains a metal-organic layer-forming substance (especially a Si-organic layer-forming substance) and, if required, oxygen or nitrogen or a gas which releases oxygen or nitrogen in a plasma. With this coating gas, the invention permits, without a change in the composition of the gas, to vary the organic content of the layer produced and permits to vary the characteristics (which are dependent upon said organic content), both only by selecting the characteristics of the pulse (duration, amplitude) or by selecting the duration of the pulse interval. (emphasis added)

Claims 1 and 21 in this Application each recite "flowing an inorganic process gas mixture". This claim element does not enable a plasma to control the organic content since there is no organic content to manipulate. Flowing an inorganic process gas mixture is neither taught nor suggested in Otto since organic content is required for the plasma to affect the refractive index.

Iyer discusses a method of forming a silicon oxynitride layer with varying refractive index. The refractive index is varied by varying the relative flow rates of precursors (see column 6 lines 15-19) in response to the refractive index determined by way of ellipsometry.

An organic process gas mixture is used to grow the film (see abstract) which distinguishes claims 1 and 21 from the prior art. Even if an inorganic silicon source had been used in the reference, it was not known until this Application that varying plasma power could modify the refractive index of a film grown from an inorganic process gas mixture.

The cited portions of Chouinard are used to introduce claim elements present only in dependent claims and do not provide information relevant to the distinctions between the independent claims and the cited portions of Otto and Iyer. The combination of references do not recite claim elements present in each of amended independent claims 1 and 21. Accordingly, independent claims 1 and 21 and their dependent claims are allowable over Otto, Iyer and Chouinard.

CONCLUSION

For at least all of the foregoing reasons, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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